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**INSTALLING A COPY OF THE ARPA/DMA  
IMAGE UNDERSTANDING TESTBED AT THE  
U.S. ARMY ENGINEER TOPOGRAPHIC  
LABORATORIES**

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## SUMMARY

➤ The principal objective of this effort is to establish a functional copy of the SRI Image Understanding (IU) Testbed system of hardware and software at the U. S. Army Engineer Topographic Laboratories (ETL) Research Institute at Fort Belvoir, Virginia. Initial tasks included advising on preparation of the ETL site for the Testbed system, purchasing the required hardware and arranging for its installation at ETL, and arranging for availability of Testbed software systems. Subsequent major tasks included additional hardware acquisition, installation and testing, installing Testbed software systems, and developing support software to enhance the overall capabilities of the system. We assisted in establishing the ETL system as a node on the DDN MILNET network as well as on a local Symbolics Lisp Machine Chaosnet/Ethernet network. Recent efforts included system software enhancement, system management consultation, and general assistance with system hardware and software troubleshooting. The main beneficial result of this project is the transfer to ETL of a large body of research technology developed by SRI and numerous other contributors to the DARPA Image Understanding research program; in addition, SRI is providing the necessary consultation and training to enable ETL to maintain such a research facility independently. ↗

## **I INTRODUCTION**

The ARPA/DMA Image Understanding Testbed system was established at SRI to provide a framework for evaluating and demonstrating the applicability of IU research results to automated cartography. A number of software systems were contributed to the Testbed by participants in the DARPA IU research program; these systems were adapted to the SRI environment and numerous additional utilities were generated at SRI specifically for the Testbed. These efforts have resulted in a system that allows the transfer of research technology to other sites for the purpose of evaluation.

The objective of installing a copy of the IU Testbed at ETL is to carry out such a transfer of technology. Possession of a Testbed copy makes ETL much more capable of not only evaluating Testbed software and environment features, but also of adapting them to specific problem areas. ETL personnel are now able to work directly with contributed IU research software and to study the implications of applying such techniques to cartographic tasks. In addition, close association with the cartographic-production branches of DMA enables ETL to cooperate closely in analyzing the application and user interface requirements that are representative of DMA's needs.

## **II PROGRESS**

We have updated the ETL Testbed copy system installed in May of 1983 with additional network capabilities and a major software update. A site visit to ETL was carried out by the SRI project leader, Andrew Hanson, on February 7-10, 1984. A major portion of this visit was devoted to staff training sessions and management consultation.

During this report period we

- Planned and delivered a series of training sessions for the ETL staff. Numerous details and features of the installed hardware and software were discussed and explained.

- Assisted with custom configuration of MILNET software features needed by the ETL-AI site. Assisted with analysis of network hardware problems.
- Assisted with analysis of Symbolics Lisp Machine Release 5.0 software installation problems.
- Customized the graphic overlay software support to enable features not supported by the original CMU graphics software.
- Updated the IU Testbed system itself. The libraries were expanded and several new program systems added; various bugs and problems were fixed.
- Specified and obtained additional hardware and software items.

The following new software systems were obtained:

- A complete Berkeley UNIX 4.2 distribution system, including documentation.
- An updated commercially supported version of the EMACS editor for use when converting to UNIX 4.2.

The following new hardware items were acquired:

- Ten Ann Arbor terminals with configurations appropriate for using the EMACS editor on the Testbed.
- A 16-line teletype controller to support the new terminals.
- Four modems to support dial-in and dial-out capabilities.
- Optical-mouse pointing device.
- Miscellaneous cables and support hardware.

The following items of equipment were previously purchased and installed for the project:

- VAX 11/780 computer system
- Grinnell GMR-275 image-processing system
- 19-inch color monitor, 15-inch monochrome monitor, three 12-inch monochrome monitors
- Versatec V-80 printer/plotter and stand
- Datamedia computer terminals
- Optronics C-4100 color film scanner
- Additional large-capacity disk drive system
- Digitizing tablet with SRI mouse-function PROM.

The following one-year service contracts acquired at the beginning of the project have now been turned over directly to ETL for continuation:

- VAX 11/780 system hardware maintenance contract
- VAX 11/780 system software maintenance contract
- Versatec V-80 hardware maintenance contract.

### III PLANS

As desired by ETL, we shall continue to furnish advice and conduct tutorials on the management and use of the system. We shall also continue to discuss the areas in which ETL needs further support and software development in order to take full advantage of the system. We will continue to plan for future support activities and tasks to be incorporated into the ETL Testbed copy effort. In particular, guidance on using the new Symbolics Lisp Machine at ETL will be provided as appropriate.

Pending the receipt of supplementary funding, we have proposed the procurement of one additional item of equipment to complete the requirements of the ETL Testbed copy system:

- One 500 megabyte disk drive for the storage of image data.

We also intend to investigate several types of stereographic display systems for possible inclusion in the SRI Testbed; if a suitable choice is found, we will consult with ETL about the desirability of obtaining a similar system for the ETL Testbed.

Specific software enhancement tasks we plan to examine in the remainder of the project include the following:

- Incorporation of Berkeley UNIX 4.2BSD software into the Testbed system when desired.
- Support of a portion of the SRI road tracker system on the ETL Grinnell display hardware.
- Incorporation of more sophisticated pointing-device software into the system utilities.
- Development of appropriate Lisp Machine support software, together with research-oriented utility systems for the Lisp Machine.

SRI plans to continue its close contact with the ETL Testbed copy system to facilitate the transfer of machine vision technology. Further training and consultation are also planned to permit ETL personnel to assume full in-house responsibility for the system when this contract terminates. ETL will then be amply equipped to evaluate current IU research concepts and to experiment with them in an efficient manner.